British Journal of Industrial Medicine 1989;46:738–743

A mortality cohort study in a north Italian aircraft factory

G COSTA,[1] F MERLETTI,[2] N SEGNAN[1]

From the Unit of Epidemiology,[1] Local Health Authority of Turin, and Unit of Cancer Epidemiology,[2] Department of Biomedical Sciences and Human Oncology, University of Turin, Turin, Italy

ABSTRACT Mortality in a cohort of 8626 workers employed between 1954 and 1981 in an aircraft manufacturing factory in northern Italy was studied. Total follow up was 132 042 person-years, with 76% accumulated in the age range 15 to 54. Median duration of follow up from the date of first employment was 16 years. Vital status was ascertained for 98·5% of the cohort. Standardised mortality ratios were calculated based on Italian national mortality rates. Altogether 685 deaths occurred (SMR = 85). There was a significant excess of mortality for melanoma (6 cases, SMR = 561). Six deaths certified as due to pleural tumours occurred. No significant excess of mortality was found in specific jobs or work areas.

A retrospective cohort study of mortality in an aircraft manufacturing plant near Turin, northern Italy, was carried out to investigate an apparently high number of malignant tumours among employees that were brought to the attention of the local health authority by staff representatives.

The plant manufactures aircraft and aircraft/aerospace components and has been active from the beginning of the century. Processes are not dissimilar to those of transportation equipment manufacturing, with more sophisticated technologies and materials. Potential hazardous substances and physical factors have been used for these processes: aromatic nitro and amino organic compounds in cutting fluids and as constituents of rubber plastic paint dye; other aromatic and halogenated organic compounds in solvents; chromates and other heavy metal salts in paints and welding fumes; epoxy resins and other plastics with amine hardeners in fibre sheet preimpregnated materials, in paints and enamels, and in adhesive materials; fibres (asbestos, manmade mineral fibres) in insulating materials and composite materials; and ionising radiation in non-destructive testing.

Materials and methods

Complete personnel records of the company were available since August 1954 only, when full scale operations were resumed after the postwar years. The workforce grew from about 1500 in 1954 to 3000 by the end of the 1950s and since then has fluctuated between 3000 and 3500. For each employee personal data and work histories within the plant (department of work and job) were abstracted and coded by clerical assistants of the plant under our guidance. A 5% sample of the records were recoded for quality control of data collection. No independent verification from sources other than company records was possible.

The study cohort includes 8626 individuals: 950 women (636 clerks and 314 blue collar workers and technical staff such as foremen and supervisors) and 7676 men (5625 blue collar workers, 965 technical staff, 571 administrative clerks, and 515 white collar workers unspecified whether administrative or technical staff). These categories refer to first recorded occupation since 1954. Employment began before 1954 for a subcohort of 1155 subjects. No minimum duration of service was introduced to allow a comparison between subjects with different periods of service.

A cumulative distribution of the cohort by age, sex, and years of starting and leaving employment, duration of services, and of follow up is presented in table 1. Half the employees had worked at least eight years at the plant; about half had been hired before 1965, thus allowing for a minimum follow up of 15 years, whereas at the beginning of the study 3536 employees (41%) were still active in the factory. The vital status of the other employees (5090) was ascertained through the local vital registries of the place where they lived or died: among them 4278 (49·6% of the total) were alive

Accepted 1 December 1988

Table 1 *Cumulative distribution (%) of some time related characteristics of the cohort members*

		Scale (%)				
	Sex	*0*	*25*	*50*	*75*	*100*
Age at hiring	M	15	21	25	31	63
	F	16	20	24	32	55
Age at leaving	M	19	27	34	48	67
	F	17	28	35	48	63
Year of hiring	M	1916	1956	1963	1972	1981
	F	1925	1956	1969	1972	1981
Year of leaving	M	1954	1965	1977		
	F	1954	1971	1981		
Duration of service (y)	M	1	3	9	18	49
	F	1	4	11	16	42
Duration of follow up (y)	M	1	10	17	26	59
	F	1	10	13	25	54

on 30 June 1981, 685 (7·8%) were dead, 71 (0·82%) could not be traced, and 56 (0·65%) had emigrated.

Local vital registries provided copies of the death certificates. The causes of death were known for all but 15 of the subjects. The underlying cause of death was coded by a trained nosologist according to the ICD rules in effect at the time of death. Codes were then grouped into cause of death categories that were consistent across the International Classification of Diseases, 7th and 8th revisions, and presented in the form of the 8th revision.

Clinical data were searched in hospitals of Italy for subjects dying of cancer of the central nervous system (CNS), cancer of the rectum, melanomas, and pleural mesotheliomas. These sites were selected either because of an interest "a priori" (cancer of CNS, see Discussion) or because of an excess found during the study.

Expected numbers of cause specific deaths were calculated by applying five year (1955–81) rates by age and sex for Italy to the person-years at risk.[1] National rates were used, since local age specific rates have been available in Italy only since 1970.

A total of 13 436 person-years at risk for women and of 118 606 person-years at risk for men were accumulated between 1 January 1954 and 30 June 1981, 76% of which were in the age range 15 to 54. Individuals whose vital status was not known were treated as alive at the end of follow up. Analysis by individual occupational history refers to having ever been in a given job and work area. Computations were performed using the life table analysis system version D computer program.[2] Standardised mortality ratios (SMRs) were calculated as the ratio of observed to expected numbers of deaths expressed as a percentage. Approximate confidence limits (two sides test based) were computed assuming a Poisson distribution for observed frequencies. Exact Fisher confidence limits were computed for observed frequencies of less than 8. The programs developed by Rothman and Boice were used.[3]

Results

OVERALL MORTALITY

Table 2 shows the general mortality by major causes of death among men. Overall mortality is significantly lower than expected. The deficit is in all major causes of death. The pattern is similar among blue collar workers, technical staff, and white collar workers not otherwise specified (NOS). Administrative clerks show slightly higher mortality based on a small number.

Table 2 *Observed deaths and SMRs by cause for male blue collar workers, technical staff members, administrative clerks, and clerks not otherwise specified (NOS)*

	Blue collar workers (n=5625/py=91 579)		*Technical staff (n=965/py=12 002)*		*Admin clerks (n=571/py=5484)*		*White collar NOS (n=515/py=9540)*		*Total male cohort (n=7676/py=118 606)*	
Cause of death ICD 8th rev)	*Obs*	*SMR (CL 95%)*	*Obs*	*SMR (CL 95%)*	*Obs*	*SMR (CL 95%)*	*Obs*	*SMR (CL 95%)*	*Obs*	*SMR (CL 95%)*
All causes	493	84 (77–92)	71	85 (67–107)	42	112 (81–152)	36	60 (42–83)	642	83 (77–90)
Malignant neoplasms (140–209)	129	89 (74–105)	20	96 (58–147)	8	87 (37–171)	11	72 (36–130)	168	88 (75–102)
Circulatory system (390–458)	204	94 (81–107)	32	104 (71–147)	17	119 (69–191)	15	67 (37–111)	268	94 (83–106)
Respiratory system (460–519)	28	66 (44–96)	2	33	1	37	4	91 (25–232)	35	63 (44–88)
Digestive system (520–577)	45	82 (60–110)	2	26	4	117 (32–299)	3	55 (11–162)	54	76 (57–99)
Genitourinary system (580–607)	4	37 (10–95)	1	66	3	441 (91–1289)	0	—	8	57 (25–113)
Accidents, poison, and violence (800–999)	50	73 (54–97)	9	101 (46–191)	7	174 (70–358)	1	14	67	76 (59–96)
Other causes	33	68 (47–95)	5	73 (24–170)	2	65	2	42	42	66 (48–89)

py = Person-years.

SMRs for female blue collar workers and technical staff are 131 for all causes (based on 26 observed) and 160 for all malignancies (based on nine observed). Corresponding figures for female clerks are 88 (17 observed) and 112 (seven observed). The size of these groups, however, is small and no cluster of cases of cancer at specific sites is identified.

In the following tables results are presented only for the cohort of 7105 men working in manufacturing areas and including blue collar workers and technical staff. White collar workers not specified as office workers are also included in this group because of the high likelihood of their having been technical staff.

SPECIFIC CAUSES OF DEATH

Table 3 lists observed deaths and SMRs for specific causes. Most of the common types of cancer occur less often in this group than in the general population. Excesses of cancer of the rectum (10 *v* 5·89) and prostate (10 *v* 7·33) are not statistically significant. Five deaths from melanoma (0·98 expected) were observed. One further case occurred among female blue collar workers *v* 0·04 expected. No melanomas were observed among male and female administrative clerks *v* 0·1 expected. The category of cancers of lung and pleura includes five deaths from tumours of the pleura. One more pleural tumour occurred among administrative clerks.

TEMPORAL CONSIDERATIONS

Mortality by specific cause is examined separately in the two groups first employed before and after 1954, the former being the surviving or cross sectional and the latter the "in-take" part of the cohort (table 3). In both groups SMRs for total mortality are significantly lower than 100. The deficit extends to all major disease categories, except circulatory diseases in those first employed before 1954 and malignant neoplasms in those first employed after 1954 (SMRs close to 100).

Excess risks for rectum and prostate cancers are confined to the first subcohort (respectively 10 *v* 4·1 and 9 *v* 6·3). Four of six cases of tumours of the pleura were also in subjects of this group. All five cases of melanoma occurred in the subcohort first employed after 1954, resulting in an SMR of 848. If the female case is also considered six cases *v* 0·63 expected occurred in this group.

Table 4 shows the analysis by duration of employment, allowing for a minimum of 15 years of follow up. In the second subcohort risk for melanoma increases with duration of employment; risk for lung cancer shows an increasing trend with a small excess in the longer duration of employment and risk for haematolymphopoietic tumours shows an overall excess (6 *v* 2·57, SMR 233, CL 95% 86–508). Risk for rectal cancer is limited to the first subcohort.

Mortality by job (14 categories) shows a small excess for all causes and all malignancies among unskilled manual workers (30 *v* 21·4 and 10 *v* 5·7). An excess is found for rectal cancer among fitters (4 *v* 1·32), lung and pleural cancer among testers (6 *v* 3·75), melanoma (2 *v* 0·08), and haemolymphopoietic tumours (3 *v* 0·95) among workbench men.

Mortality by work area (16 categories) shows excess tumours of buccal cavity and pharynx in heat treatment (3 *v* 0·70), melanomas (2 *v* 0·14) and prostate (3 *v* 1·07) in metal forming, urinary organs in machining (4 *v* 1·99), haematolymphopoietic (3 *v* 1·27) and rectum (3 *v* 0·85) in two different and specific assembling areas, stomach (6 *v* 2·97) in fixture and joinery, and stomach (4 *v* 1·82) in maintenance.

INDIVIDUAL CHARACTERISTICS OF PEOPLE DYING FOR SPECIFIC CANCER SITES

The six cases of melanoma had been hired after 1954; mean age at death was 43; latency from first employment in the factory ranged from eight to 19 years and duration of employment from one to eight years. No death from melanoma was observed among the 1113 office clerks of both sexes against 0·10 expected. Individual work histories did not suggest any obvious cluster of jobs or operations, although all men were employed at the plant at the same time during the 1960s. Clinical records reported that melanomas were located in the leg in three cases and in the trunk for the remaining three.

The six tumours of the pleura (ICD 163.0, 8th rev) were treated in the analysis with lung cancer because the reference mortality data for this cancer have been available in Italy only since 1969. Nevertheless, 0·55 pleural tumours were expected during 1969–81 (after the introduction of the ICD 8th rev in Italian mortality statistics) among men, blue collar workers, and technical staff, against five observed. All cases were men with a mean age at death of 70; five were aged 35 or over at the time of first employment in the factory. Work histories included many different jobs (assembler, plumber, joiner, turner, or technical staff). Diagnoses were mostly based on radiological findings. No case was necropsied. Two subjects were not smokers according to clinical records.

SMRs for tumours of the CNS among male blue collar workers and technical staff was 79 (3 *v* 3·8) when malignant tumours (ICD 191, 8th rev) were considered. The ratio of observed to expected was 7 *v* 6·96 when CNS tumours of unspecified nature (ICD 238, 8th rev) and CNS benign tumours (ICD 225, 8th rev) were also considered. No cases were observed among female and male clerks. The available work histories did not suggest any cluster of jobs or work areas affected. Clinical records could not be traced for three cases and were poor for two; the remaining two

Table 3 *Observed deaths by cause and SMRs for male blue collar workers and technical staff by year of hiring*

Cause of death (ICD 8th rev)	*Hired ≤ 1954 (n=1155/py=26 822)*			*Hired > 1954 (n=5950/py=86 298)*			*Total (n=7105/py=113 120)*		
	Obs	*SMR*	*CL 95%*	*Obs*	*SMR*	*CL 95%*	*Obs*	*SMR*	*CL 95%*
All causes	401	83	76– 92	199	79	69– 91	600	82	76– 89
Malignant neoplasms (140–209):	102	84	68–102	58	96	73– 124	160	88	75– 103
Cancer of buccal cavity and pharynx (140–149)	4	98	27–251	1	44	—	5	79	25– 183
Cancer of digestive system (150–159):	39	85	61–117	12	66	34– 115	51	80	59– 105
Cancer of oesophagus (150)	—	—	—	1	71	—	1	21	—
Cancer of stomach (151)	16	75	43–122	4	54	15– 139	20	70	43– 108
Cancer of intestine (152–153)	6	84	31–183	4	121	33– 309	10	96	46– 176
Cancer of rectum (154)	10	241	116–444	—	—	—	10	170	81– 312
Cancer of liver and biliary ducts (155–156)	3	57	12–168	2	105	—	5	70	23– 164
Cancer of pancreas (157)	3	80	16–234	1	52	—	4	71	19– 181
Cancer of respiratory system (160–163):	33	86	59–120	18	94	55– 148	51	88	66– 116
Cancer of larynx (161)	2	41	—	—	—	—	2	27	—
Cancer of lung and pleura (162–163)	30	93	63–133	18	112	67– 178	48	99	73– 132
Cancer of bone (170)	1	71	—	1	95	—	2	81	—
Melanoma (172)	—	—	—	5	847	275–1978	5	510	166–1191
Cancer of skin (173)	1	196	—	—	—	—	1	139	—
Cancer of prostate (185)	9	142	65–270	1	100	—	10	136	65– 251
Cancer of urinary system (188–189)	3	43	9–127	4	155	42– 397	7	74	30– 153
Cancer of brain (191)	2	116	—	1	48	—	3	79	16– 231
Lymphatic and haematopoietic cancer (200–209)	4	54	15–138	8	106	46– 209	12	80	41– 140
Other cancers (171, 174, 186, 187, 190, 192–194) and cancer NOS (195–199)	6	73	27–159	7	125	50– 258	13	94	50– 161
Diseases of nervous system (320–385)	7	144	58–296	1	23	—	8	86	37– 170
Diseases of circulatory system (390–458)	196	97	84–111	55	81	61– 105	251	93	82– 105
Diseases of respiratory system (460–519)	29	70	47–101	5	44	14– 102	34	65	45– 90
Diseases of digestive system (520–577)	31	76	51–107	19	71	42– 110	50	74	55– 97
Diseases of genitourinary system (580–607)	3	33	7– 98	2	46	—	5	37	12– 88
Accidents, poisoning, and violence (800–949, 960–999)	14	60	33–100	39	77	55– 106	53	72	54– 94
Suicide (950–959)				7	112	45– 230	7	67	27– 138
Other causes	19	58	35– 91	13	69	36– 117	32	62	42– 88

py = Person-years.

included a histologically confirmed glioma and a carcinoma of paranasal sinuses.

All cases of rectal cancer had been first employed in the factory before 1954. Five had been working in assembling areas, mostly with fitting jobs. Clinical records were traced for five cases: in four the evidence of the rectum as the origin of the cancer was strong; in one case it was not possible to discriminate between colon and rectum.

Discussion

Mortality of aircraft manufacturing employees has been described in a limited number of studies. Garabrant *et al* in a cohort of 14 067 subjects employed between 1958 and 1982 found non-significant excesses of cancer of the oesophagus (O/E 14/12·3), pancreas (34/28·5), and bladder (17/13·4).[4] The study found no excess of melanoma (5/9·3), mesothelioma, or neoplasms of the CNS. The surveillance study of proportional mortality by occupation in Washington State showed significant excesses for all malignant neoplasms and for some cancer sites (including some digestive organs, haematolymphopoietic system, and melanomas) among aeronautical engineers of different companies and among Boeing officials, managers, and supervisors.[5] In aeronautical engineers aged under 65 proportional mortality ratios (PMR) for melanomas were twice as high as expected. Boeing workers not otherwise classified showed only a small but significant PMR increase for coronary heart diseases. Moreover, airplane mechanics, repairmen, and electricians, not necessarily employed at the Boeing company, showed a significant excess risk of CNS tumours. A preliminary investigation of CNS neoplasms in Los Angeles County (another United States area of high density of aircraft industry) showed excess risk among aircraft manufacturing employees, in particular for engineers.[6]

Our study, as of 1981, finds no excess either for oesophageal cancer or for CNS tumours. The study had 56% and 71% powers to detect any significant risk greater than twofold at the 5% significance level for these two cancer sites respectively.

Table 4 *Observed deaths and SMRs by cause for male blue collar workers and technical staff by year of hiring and duration of employment, allowing for 15 years of follow up*

	Hired ⩽ 1954						*Hired > 1954*					
	0–4		*5–14*		*⩾15*		*0–4*		*5–14*		*⩾15*	
Cause of death (ICD 8th rev)	*Obs*	*SMR*	*Obs*	*SMR*	*Obs*	*SMR*	*Obs*	*SMR*	*Obs*	*SMR*	*Obs*	*SMR*
All causes	2	107	30	84	350	83	28	84	26	80	39	93
Malignant neoplasms (140–209):	—	—	5	59	94	87	9	95	11	121	14	112
Buccal cavity and pharynx (140–149)	—	—	—	—	4	111	—	—	—	—	—	—
Digestive system (150–159):	1	555	2	64	35	87	3	120	2	83	2	555
Oesophagus (150)	—	—	—	—	—	—	—	—	1	87	—	—
Stomach (151)	—	—	1	69	14	75	—	—	1	185	1	141
Intestine (152, 153)	—	—	—	—	6	94	1	370	—	—	1	278
Rectum (154)	—	—	1	333	9	244	—	—	—	—	—	—
Liver and biliary ducts (155–156)	—	—	—	—	3	66	2	714	—	—	—	—
Pancreas (157)	1	5000	—	—	2	60	—	—	—	—	—	—
Respiratory system (160–163):	—	—	2	78	31	90	2	59	2	63	6	125
Larynx (161)	—	—	—	—	2	46	—	—	—	—	—	—
Lung and pleura (162–163)	—	—	2	93	28	97	2	70	2	74	6	147
Bone (170)	—	—	—	—	1	81	—	—	—	—	—	—
Melanoma (172)	—	—	—	—	—	—	1	1111	3	4412	—	—
Skin (173)	—	—	—	—	1	227	—	—	—	—	—	—
Prostate (185)	—	—	2	351	7	123	—	—	1	357	—	—
Urinary system (188–189)	—	—	—	—	3	48	1	217	1	213	1	161
Brain (191)	—	—	—	—	2	133	—	—	—	—	—	—
Lymphatic and haematopoietic (200–209)	—	—	—	—	4	62	2	244	2	270	2	198
Other (171, 174, 186, 187, 190, 192–194) and cancer NOS (195–199)	—	—	—	—	6	84	—	—	—	—	3	291
Disease of nervous system (320–385)	—	—	—	—	7	167	—	—	—	—	1	192
Disease of circulatory system (390–458)	2	264	19	118	168	94	11	102	9	79	12	87
Disease of respiratory system (460–519)	—	—	3	93	19	52	1	64	—	—	—	—
Disease of digestive system (520–577)	—	—	1	36	27	75	3	73	1	27	4	76
Disease of genitourinary system (580)	—	—	1	145	1	13	—	—	—	—	—	—
Accidents, poisonings, and violence (800–949, 960–998)	—	—	—	—	11	57	3	79	3	94	5	121
Suicide (950–959)	—	—	—	—	—	—	—	—	2	364	1	143
Other causes	—	—	1	45	18	65	1	52	—	—	2	84

The healthy worker effect may be seen operating differently in this cohort: lower mortality among male blue collar workers and technical staff may be due to selective hiring of healthy employees. SMRs for all causes among male administrative clerks and among all women were higher than 100. This may reflect the absence of health selection.

In our study there was an excess of deaths from pleural cancer, cancers of the rectum, and melanomas in male blue collar workers and technical staff.

The increased risk for tumours of the pleura is particularly in people with a long duration of follow up and of employment from the early 1940–50s. This finding is interesting but is obscured by poor reliability of diagnoses. No cases of asbestosis nor excess risk for lung cancer are reported in the study. At present asbestos is not used in the plant but past uses cannot be ruled out. Exposures to asbestos in work before hiring in the plant cannot be ruled out. On the other hand, the finding of an excess of pleural cancer cannot be dismissed on these grounds, because manmade mineral fibres were used at the plant from 1954, mainly in composite materials.

Clinical record retrieval has not provided a definite discrimination between cancers of the rectum and colon for six of 10 cases. Pulling together the two sites, a non-significant excess is found in the group hired before 1954 with 16 observed against 11·28 expected (SMR 142, CL 95% 81–230); this residual excess could be partly explained by the choice of the Italian population as a reference, which has a colon/rectum cancer mortality substantially lower than the regional one.[7]

With regard to melanomas, there are no reasons to think that survival for melanoma is lower in Turin than in the rest of Italy, nor that the use of regional mortality as a reference may change substantially the O/E ratio. Based on individual work histories, no particular job is affected by the risk. Nevertheless, all five male cases were employed at the factory at the same time during the early 1960s, when some aircraft projects necessitated extensive use of polysulphide resin based adhesives. Epoxy resins were introduced in paints and in fibreglass reinforced plastics, mainly in assembling areas, where four out of five cases had been employed in this period for any length of time. All six

melanomas were located on areas of the body surface that are usually covered.

Our findings are consistent with those of Milham's surveillance system[5] whereas no excess for melanomas was found by Garabrant.[4] A recent review of specific agents and economic activities possibly associated with melanoma may suggest a concentration of cases in high technology industries such as ours.[8] This may be confounded by the known role of higher social class.[8] On the other hand, in our study five of six cases were blue collar workers.

Our findings suggest an increased risk for melanomas among the younger workers, employed more recently and working in manufacturing areas. Given that exposures are multiple, a specific chemical or other cause for this excess cannot be hypothesised.

In conclusion, this study shows an increased risk of death for melanoma and possibly for tumours of the pleura in this aircraft industry. Difficulties in investigating the role of specific chemicals or physical risk factors hindered the interpretation of these findings.

This study was made possible by a grant from the company to the unit of epidemiology of the Local Health Authority of Turin. We are indebted to Benedetto Terracini and David Garabrand for reviewing the manuscript and to Rossana Prandi and Ernesto Bertagna for clerical help.

Requests for reprints to: Dr G Costa, Unit of Epidemiology, National Health Service, via S Francesco da Paola 31, 10123 Turin.

References

1 Zocchetti C, Bertazzi PA. Un programma computerizzato per l'analisi di studi di coorte di mortalità negli ambienti di lavoro. *Med Lav* 1982;**73**:9–21.
2 Waxweiler RJ, Beaumont JJ, Henry JA, *et al.* A modified life-table analysis system for cohort studies. *J Occup Med* 1983;**25**: 115–24.
3 Rothman KJ, Boice JD. *Epidemiologic analysis with a programmable calculator.* Washington: National Institutes of Health, 1979. (Publ No 79–1649.)
4 Garabrant DH, Held J, Langholz B, Berstein L. Mortality of aircraft manufacturing workers in southern California. *Am J Ind Med* 1988;**13**:683–93.
5 Milham S. *Occupational mortality in Washington State 1950–79.* Cincinnati: US Department of Health and Human Services (National Institute of Occupational Safety and Health) 1983. (Publ No 83–116.)
6 Preston-Martin S, Henderson BE, Peters JM. Descriptive epidemiology of central nervous system neoplasms in Los Angeles County. *Ann NY Acad Sci* 1982;**381**:202–8.
7 Capocaccia R, Farchi G, Mariotti S, *et al.* La mortalità in Italia nel periodo 1970–79. Rome: Istituto Superiore di Sanità, 1984. (Rapporto ISTISAN 84/10.)
8 Austin DF, Reynolds P. Occupation and malignant melanoma of the skin. *Recent Results in Cancer Research* 1986;**102**:98–107.

Correspondence and editorials

The *British Journal of Industrial Medicine* welcomes correspondence relating to any of the material appearing in the journal. Results from preliminary or small scale studies may also be published in the correspondence column if this seems appropriate. Letters should be not more than 500 words in length and contain a minimum of references. Tables and figures should be kept to an absolute minimum. Letters are accepted on the understanding that they may be subject to editorial revision and shortening.

The journal now also publishes editorials which are normally specially commissioned. The Editor welcomes suggestions regarding suitable topics; those wishing to submit an editorial, however, should do so only after discussion with the Editor.